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Arthonia anatolica sp. nov. (*Arthoniaceae*) on *Aspicilia contorta* subsp. *hoffmanniana*, a new lichenicolous species from Turkey

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Abstract —*Arthonia anatolica* sp. nov. is described on *Aspicilia contorta* subsp. *hoffmanniana* on calcareous rocks from central and eastern Turkey. The new species clearly differs from the other *Arthonia* species reported on *Aspicilia* sp. and most closely resembles *Arthonia amylospora*, a species known on *Porpidia rugosa*. The differences are discussed.

Key words — *Ascomycota*, lichenicolous fungi, lichens

Introduction

The genus *Arthonia* Ach. includes c. 500 species (Hawksworth et al. 1995), the majority of which are lichenized. About 83 species are lichenicolous fungi (Grube & Matzer 1997, Candan & Halıcı 2009, Halıcı 2008a, Halıcı & Candan 2009, Zhurbenko & Grube 2010; Etayo 2010), and 38 lichenicolous species were included in the key to *Arthonia* by Clauzade et al. (1989). Recently, 27 *Arthonia* species were included in the annotated key to the lichenicolous fungi of Sweden (Ihlen & Wedin 2008), while 9 species were included in the key to the lichenicolous fungi of Turkey (Halıcı 2008b). Grube & Matzer (1997) provided useful taxonomical characters for *Arthonia*, focusing primarily on lichenicolous taxa.

Currently 160 lichenicolous fungi species are known from Turkey (Halıcı et al. 2010), with at least 250 species total expected from the country (Halıcı et al. 2007). Of the 16 lichenicolous *Arthonia* species reported from Turkey (Hafellner & John 2006, Candan & Halıcı 2009, Halıcı 2008a,b, Halıcı & Candan 2009), four — *A. aysenae* Halıcı & Candan on *Acarospora cervina, A. epitoninia* Halıcı & Candan on *Toninia* sp., *A. hawksworthii* Halıcı on *Dimelaena oreina, A. rinodinicola* Candan & Halıcı on *Rinodina gennarii* — have been originally

described from Turkey (Halıcı 2008a, Candan & Halıcı 2009, Halıcı & Candan 2009). We propose here a new species, *A. anatolica* on *Aspicilia contorta* subsp. *hoffmanniana,* based on two collections from central and eastern Turkey.

Material & methods

The type material and the additional examined specimen of the new species are deposited in the lichen herbarium of Erciyes University (Kayseri, Turkey) and ANES. Specimens were examined with Leica DM 1000 research microscope. Microphotographs were taken with Leica DFC 420 digital microscope camera with c-mount interface and with a 5 megapixel CCD. Sections were prepared by hand and examined in I (Merck Lugol's iodine) and water. Ascospore measurements were made in water. Ascospore and asci measurements were given as: the arithmetic mean, flanked by the mean ± standard deviation and parenthetical minimum and maximum values. All measurements and ratio includes the halo in ascospores. The length/breadth ratio of ascospore is indicated as l/b and given in the same way.

Taxonomy

Arthonia anatolica Halıcı & Candan, **sp. nov.** FIGURE 1

MycoBank MB 519953

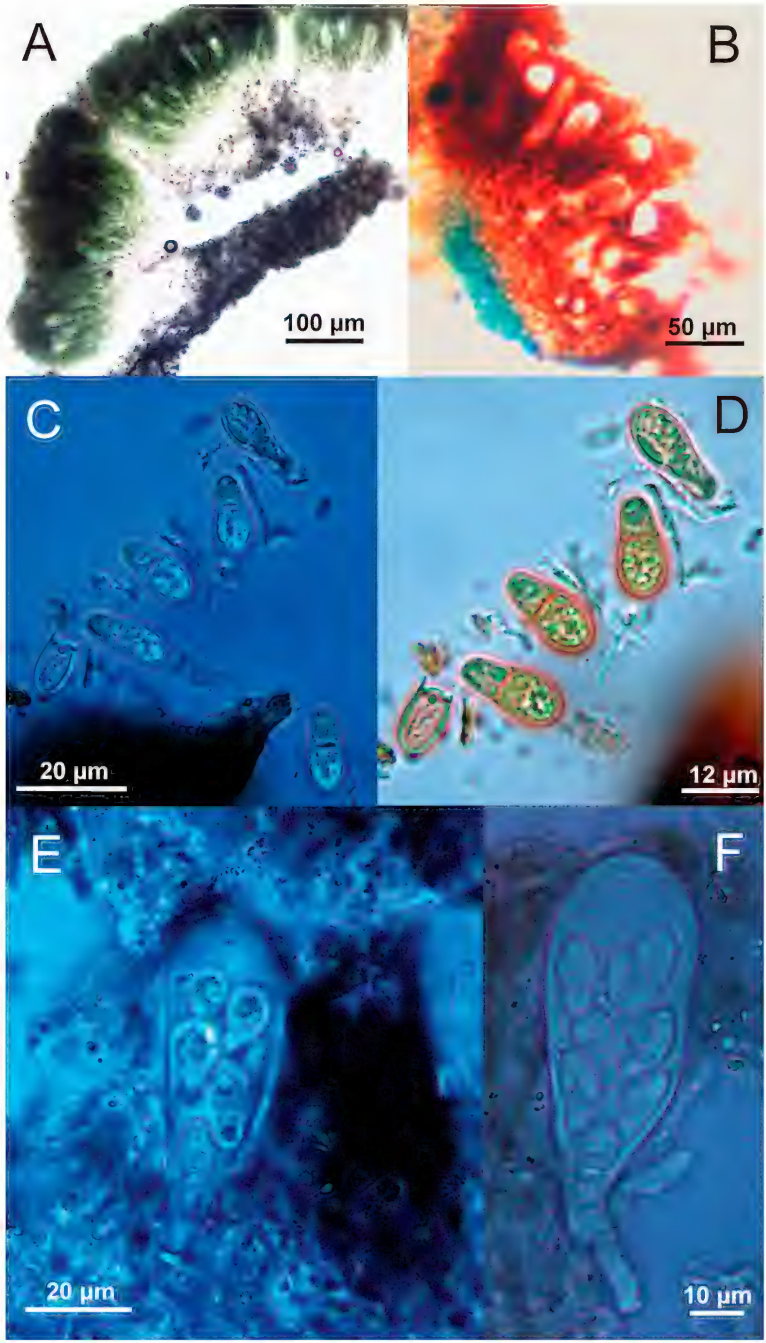
Fungus in thallo Aspicilia contortae *incolens. Apothecia nigra, 200–300 µm diam. Epithecium 10–20 µm altum, olivaceo-brunneum. Hymenium 100–110 µm altum, olivaceum. Hypothecium 10–15 µm altum, hyalinum. Asci (49–)53–64–74(–90) × (20–)21.5–25–28(–29) µm, clavati, octospori. Ascosporae 1-septatae, hyalinae, halonatae, (15–)18–19–21(–23) × (7–)8–9–10(–11) µm.*

TYPE: Turkey, Kayseri, Develi, Bakırdağ, vicinity of Kale Village, steppe area with calcareous mother-rock, 38°06'N, 35°42'E, alt. 1550 m, on thallus of *Aspicilia contorta* subsp. *hoffmanniana* S.Ekman & Fröberg ex R.Sant. on calcareous rocks, 3 September 2010, leg. M. G. Halıcı (0.6799) (Erciyes University, Lichen herbarium – **holotype**).

ETYMOLOGY: The specific name refers to Anatolia, the name of the geographical area of Asian Turkey.

DESCRIPTION: Lichenicolous, on the areoles of *Aspicilia contorta* subsp. *hoffmanniana*, causing slight bleaching in the infected parts, weakly parasitic. VEGETATIVE HYPHAE below the hypothecium I+ blue. ASCOMATA apothecioid, aggregated, numerous, 200–300 µm diam., black, epruinose, superficial, lacking an exciple, arthonioid. Epithecium olivaceous brown, K– 10–20 µm high; hymenium olivaceous green, I+ red, KI–, 100–110 µm high; hypothecium colourless, 10–15 µm high. HAMATHECIUM of paraphysoids, abundant, septate, branched and anastomosed, 2–2.5 µm wide. ASCI broadly clavate, shortly stalked, bitunicate in structure, 8-spored, inner part I+ red, KI–, without a

FIG. 1 (to right). *Arthonia anatolica* (holotype). A, Hymenium in KI; B, Hymenium in I; C, Ascospores in water; D, Ascospores in I, showing the I + purple-red gelatinous sheath; E, F, Asci.


A
100 µm
B
50 µm
C
20 µm
D
12 µm
E
20 µm
F
10 µm

KI+ blue apical ring, (49–)53.2–*63.8*–74.4(–90) × (20–)21.6–*24.8*–28(–29) µm (*n* = 20). Ascospores irregularly arranged in the asci, ellipsoid, hyaline, 1-septate, rounded to somewhat broadly pointed at the apices, slightly constricted at the septa, the upper cell larger and longer than the lower one, halonate, halo ~1 µm, smooth, I+ purple-red, (15–)18–*19*–21(–23) × (7–)8–*9*–10(–11) µm (*n* = 44), l/b = (1.45–)1.91–*2.20*–2.49(–3.0). Conidiomata not observed.

Ecology and distribution: *Arthonia anatolica* seems to be parasymbiotic or weakly parasitic on the thalli of *Aspicilia contorta* subsp. *hoffmanniana,* as slight bleaching occurs in the infected areoles of the host. The new species is known from two localities in central and eastern Turkey, where steppe vegetation is pre-dominant. As the host species has a wide distribution in the northern hemisphere on calcareous rocks, the species should be sought elsewhere.

Additional specimen examined: **TURKEY**, **Elazığ**, southwest of Hıdırbaba Village, steppe area with calcareous mother-rock, 38°45′N, 39°00′E, alt. 1120 m, on thallus of *Aspicilia contorta* subsp. *hoffmanniana* on calcareous rocks, 4 August 2004, leg. M. Candan (ANES 11635).

Observations: Following Grube & Matzer (1997), *Arthonia anatolica* belongs to the *A. radiata* group because of its olivaceous brown epithecium and thick interascal filaments.

Several species of *Arthonia* are known or reported on *Aspicilia* spp. *Arthonia aspiciliae* Alstrup & E.S. Hansen is known on *Aspicilia elevata* from Greenland (Alstrup & Hansen 2001) and has much smaller (11–13 × 5–6 µm) ascospores than *A. anatolica*. Similarly, *Arthonia hertelii* (Calat. et al.) Hafellner & V. John, which is known on vagrant *Aspicilia* spp. mainly in the steppe (Calatayud et al. 2004), clearly differs from *A. anatolica* in having smaller ((12–)14–*15*–17 × (4–)5–*5*–6 µm)) and non-halonate (or inconspicuously halonate) ascospores, a pale brown hymenium with an I+ purple reaction, and a deep brown hypothecium. *Arthonia urceolata* (Elenkin) V.J. Rico et al., also a common species on vagrant *Aspicilia* species in the Eurasian steppe (Calatayud et al. 2004), has clearly smaller ((12–)13–*14*–16(–18) × (4.5–)5–*5*–6 µm) ascospores and a hymenium with an I+ purple reaction. *Arthonia oligospora* Vězda was reported on *Aspicilia* sp. from the eastern part of Turkey (Candan & Halıcı 2008) and from Iran (Valadbeigi & Sipman 2010); *A. oligospora* has 4-spored asci and much smaller ((12.5–)14–16 × 6.5–7 µm) ascospores than *A. anatolica*. *Arthonia lobothalliae* Etayo, a species described on *Lobothallia alphoplaca,* also has much smaller (11–12.5 × 4.5–5 µm) ascospores (Etayo 2010).

Arthonia amylospora Almq. on *Porpidia rugosa* appears most similar to *A. anatolica* (Triebel 1989, Ihlen & Wedin 2008). Besides having a different host, the hymenium is brownish and shorter (45–55 µm), the hypothecium is dark brown, and the asci are much smaller (36–38 × 19 µm) than in *A. anatolica*. Ascospore sizes of *A. amylospora* are given as 18–21 × 6–8 µm in Triebel

(1989) and 16–24 × 6–10 µm in Ihlen & Wedin (2008) whereas *A. anatolica* has ascospores in range of (15–)18–*19*–21(–23) × (7–)8–*9*–10(–11) µm.

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